Claims 1, 2, 4, 8-10, 14, 15, 19, 20, 35 and 38 were rejected under 35 USC §103(a) as being unpatentable over Liu in view of Guiles ('658). This basis for rejection is respectfully traversed.

Liu discloses a crank arm (12) with a through opening (21) and an inside gearing member (20) with positioning lugs (25) forming abutments (252). The abutments (252) and the gearing member (20) form a concave structure. Guiles discloses crank arm (8) with a collar (9) forming projecting teeth (10) for engaging ratchet teeth (7) of a sprocket wheel. The projecting teeth (10) and the collar (9) form a non-concave structure. The examiner states that Guiles forms such a non-concave structure in order to reduce weight and to avoid frictional contact during operation, and that objective provides a motivation to combine the teachings of Guiles with Liu.

There must be some logical reason apparent from positive, concrete evidence of record which justifies a suggestion to modify a prior art structure. See In re Regel, 188 USPQ 136, 139 (CCPA 1975). The examiner may not resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in the evidence. Ex parte Haymond, 41 USPQ2d 1217 (BdPatApp&Int 1996). Guiles is silent about why his structure is non-concave. Thus, there is no evidence of record which supports the allegation that Guiles forms such a non-concave structure in order to reduce weight and to avoid frictional contact during operation. In fact, it requires more material to form a non-concave surface than a concave surface, thus logically increasing the weight of the structure. Consequently, there is no basis to support an alleged motivation to combine particular features of Guiles with Liu.

Claim 31 was rejected under 35 U.S.C. §103(a) as being unpatentable over Liu in view of Guiles and Yamanaka ('072). It is respectfully submitted that claim 31 is patentable for the same reasons noted above.

Claims 32 and 36 were rejected under 35 U.S.C. §103(a) as being unpatentable over Liu in view of Guiles. It is respectfully submitted that claims 32 and 36 are patentable for the same reasons noted above. Furthermore, it is well settled that the examiner has the burden of providing a motivation to create a claimed structure. A conclusory reference to "design choice" does not suffice. In re Dembiczak 50 USPQ2d 1614 (Fed.Cir. 1999).

Claims 21-23 were rejected under 35 U.S.C. §103(a) as being unpatentable over Liu in view of Guiles and Browning. It is respectfully submitted that claims 21-23 are patentable for the same reasons noted above. Furthermore, the examiner states that Browning uses four mounting arms, a large diameter sprocket and a small diameter sprocket in order to make the system easy to operate and to increase the ease during replacement of sprockets. However, Browning is silent about why that particular configuration is used, so again there is no evidence to support such a motivation.

Claims 24-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Liu in view of Guiles and Hsu. It is respectfully submitted that claims 24-25 are patentable for the same reasons noted above for claim 1.

Claim 7 was rejected under 35 U.S.C. §103(a) as being unpatentable over Guiles in view of Yamanaka. However, the explanation of the rejection refers a Yang reference. It is assumed that U.S. Patent No. 5,083,991 issued to Yang was intended. This basis for rejection is respectfully traversed.

The examiner states that Yang discloses a drive ring (161) that includes a plurality of splines that engage a plurality of splines in a crank arm (10). However, the splines in Yang nonrotatably fix the ring (161) to the axle, not the crank arm as required by claim 7

Accordingly, it is believed that the rejections under 35 USC §103 have been overcome by the foregoing remarks, and it is submitted that the claims are in condition for allowance. Reconsideration of this application is respectfully requested. Allowance of all claims is earnestly solicited.

Respectfully submitted,

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VERSION OF AMENDMENTS WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

The paragraph beginning at page 4, line 16 has been amended as follows:

Fig. 1 is a partial cross sectional view of a bicycle bottom bracket assembly 10 that incorporates a particular embodiment of an assisting apparatus 14 according to the present invention for shifting a bicycle transmission. Bottom bracket assembly 10 includes a bottom bracket shell 18 that is mounted to a typical bicycle frame (not shown), a tubular axle supporting sleeve 22, a sleeve coupler 26, an axle 30, ball bearings 34 and 38, and crank arm assemblies 42 and 46. Axle supporting sleeve 22 has a radially outwardly extending flange 50 on a first end thereof for retaining a mounting member 300 of assisting apparatus 14 to bottom bracket shell 18, bearing surfaces 58 and 62 for engaging ball bearings 34 and 38, respectively, and an outer peripheral surface 66 at a second end for engaging an inner peripheral surface 70 of sleeve coupler 26. Sleeve coupler [70] 26 includes a radially outwardly extending flange 74 for engaging the side of bottom bracket shell 18.

IN THE CLAIMS

Claims 1, 7, 24, 31, 35 and 36 have been amended as follows:

1. (Amended) A drive mechanism for a bicycle transmission assist mechanism comprising:
a crank arm having a crank axle mounting hole around a rotational axis; and
a drive member supported coaxial with the rotational axis and including:
a first abutment facing a forward rotational direction of the crank arm; and
a non-concave first sloped surface extending from a radially outer portion of the abutment and facing a rearward rotational direction of the crank arm.

7. (Amended) A drive mechanism for a bicycle transmission assist mechanism comprising:

a crank arm having a rotational axis; and

a drive member comprises an annular drive ring mounted around the rotational axis and including:

a first abutment facing a forward rotational direction of the crank arm; and

a non-concave first sloped surface extending from a radially outer portion of the abutment and facing a rearward rotational direction of the crank arm; and

[The drive mechanism according to claim 6] wherein an inner peripheral surface of the drive ring includes a plurality of drive ring splines, and wherein an outer peripheral surface of the crank arm includes a plurality of crank arm splines that engage the plurality of drive ring splines.

24. (Amended) A drive mechanism for a bicycle transmission assist mechanism comprising:

a crank arm having a rotational axis;

wherein the crank arm includes a sprocket mounting member for mounting a sprocket to the crank arm;

a large diameter sprocket retained to the sprocket mounting member;

a small diameter sprocket retained to the sprocket mounting member; and

a drive member including:

a first abutment facing a forward rotational direction of the crank arm; and

a non-concave first sloped surface extending from a radially outer portion of the abutment and facing a rearward rotational direction of the crank arm;

[The drive mechanism according to claim 23] wherein the large diameter sprocket includes a shift assist mechanism for assisting travel of a chain between the small diameter sprocket and the large diameter sprocket.

31. (Amended) A drive mechanism for a bicycle transmission assist mechanism comprising:

a crank arm having a rotational axis; and

a drive member including:

a first abutment facing a forward rotational direction of the crank arm; and

a non-concave first sloped surface extending from a radially outer portion of the abutment and facing a rearward rotational direction of the crank arm;

[The drive mechanism according to claim 1] wherein the crank arm has a crank axle mounting hole, and further comprising a plurality of splines disposed in the crank axle mounting hole.

35. (Amended) A drive mechanism for a bicycle transmission assist mechanism comprising:

a bicycle crank arm having a crank axle mounting boss including a crank axle mounting hole and a rotational axis; and

only two abutments disposed on an outer surface of the crank axle mounting boss and facing a forward rotational direction of the crank arm;

wherein the two abutments rotate coaxially around the rotational axis.

36. (Amended) A drive mechanism for a bicycle transmission assist mechanism comprising:

a bicycle crank arm having a crank axle mounting boss including a crank axle mounting hole and a rotational axis; and

a drive member disposed at the crank axle mounting boss and including:

an outer peripheral surface;

wherein an abutment is disposed on the outer peripheral surface and [facing] faces a forward rotational direction of the crank arm;

wherein the abutment rotates around the rotational axis at a substantially constant radius; and

wherein the outer peripheral surface at a location of intersection with a radially inner portion of the abutment extends convex for at least 20°.